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CORRES CONTROL
OUTGOING LTR NO

83 RF 3004



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Rocky Flats Plant
Aerospace Operations
Rockwell International Corporation
P O Box 464
Golden Colorado 80402-0464
(303) 966-7000

Rockwell
International

Contractor to U S Department of Energy

SEP 27 1988

88-RF-3004

Albert E. Whiteman
Area Manager
DOE, RFAO

Attn. T W. Anderson

ESTIMATED HEALTH AND ENVIRONMENTAL EFFECTS FROM AIRBORNE RELEASE OF ORGANIC SOLVENTS

In response to your August 31, 1988, request the attached information on health and environmental effects from airborne release of materials has been developed by the Environmental Management Section of the Health, Safety and Environment Department. This information includes a preliminary assessment of health effects of released quantities of toxic chemicals for CY1987 and an indication of further action which could be pursued on this subject. A copy of a June 30, 1988 letter summarizing the information reported to the Environmental Protection Agency on toxic chemicals released in CY1987 is enclosed for your information.

Information on chlorinated hydrocarbon solvent reductions has been sent previously in an August 19 letter (D J Sanchini to A E Whiteman, Chlorinated Hydrocarbon Solvent Reductions - Rocky Flats Plant). A copy of this letter is attached.

If you have any questions on this information, please contact Nancy M Daugherty of Environmental Management, ext 7005

D J Sanchini
Dominick J Sanchini
President

Orig and 1 cc - A E Whiteman
Encs (3)

ADMIN RECORD

REVIEWED FOR CLASSIFICATION
By *PL*
Date *4/20/91*

SW-A-003824

ESTIMATED HEALTH AND ENVIRONMENTAL EFFECTS FROM
AIRBORNE RELEASE OF TOXIC CHEMICALS

September 23, 1988

TOXIC RELEASE REPORTING TO EPA FOR CY1987

Per the Community Right-To-Know regulations (SARA Title III, Section 313), releases reported to the Environmental Protection Agency from the Rocky Flats Plant of toxic chemicals for CY1987 included those chemicals for which the Plant 1987 usage exceeded 10,000 lbs. or the manufactured/processed quantity exceeded 75,000 lbs. The following chemicals and their release quantities were reported.

<u>CHEMICAL</u>	<u>1987 RELEASE QUANTITY</u>
Organics	
Carbon Tetrachloride	130,000 lbs
1,1,1 Trichloroethane	81,990 lbs
Freon 113	123,900 lbs
Bases and Acids	
Ammonia	<2,000 lbs
Sodium Hydroxide	<500 lbs
Nitric Acid	59,000 lbs
Hydrochloric Acid	30,500 lbs
Sulfuric Acid	<1,900 lbs
Phosphoric Acid	280 lbs
Hydrogen Fluoride	<1,000 lbs

All of the material was released via the air pathway. A release quantity was not reported for methylene chloride because the usage and manufactured/processed quantity thresholds (10,000 and 75,000 lbs, respectively) were not met for this chemical. For information purposes, usage of methylene chloride in 1987 was about 5700 lbs, and it is expected that most of that was released to the air from volatilization of this chemical.

POTENTIAL HEALTH AND ENVIRONMENTAL EFFECTS

Primary health effects from carbon tetrachloride include liver damage and carcinogenesis. Liver damage is possible from 1,1,1 trichloroethane also, but no carcinogenicity has been demonstrated for this compound. Methylene chloride can produce liver damage, and it has been identified as a probable carcinogen. Carbon tetrachloride would be considered the most hazardous of these three organic compounds based on both its greater carcinogenic potency (EPA, 1984) and its more restrictive occupational exposure Threshold Limit Value (ACGIH, 1987-88). In addition, Rocky Flats Plant release values for CCl_4 are greater than for the other two compounds.

Freon 113 is relatively non-toxic for direct exposures. However, as a chlorofluorocarbon it has the potential for contributing to the degradation of the earth's ozone layer and resulting in indirect health and environmental effects because of the resulting increase in ultraviolet radiation.

The acids and bases which were reported have not been identified as carcinogens, but have the potential for other health and environmental effects from direct exposure. Health effects would include irritation and burning of exposed tissues. Environmental effects could include a contribution to acid rain. In addition, chemical reactions and breakdown of these acids and bases may result in the production of secondary chemicals which could have health and environmental effects. An example would be the breakdown of nitric acid into NO_2 , which could then contribute to acid rain and ozone formation.

Preliminary assessments have been made of the projected health impact from direct exposure of all of the reported released chemicals using simplifying assumptions which would generally tend to overestimate the projected impact. The approach taken was similar to that taken by Los Alamos Technical Associates in preparing the June 1988 "Draft Environmental Assessment for the Fluidized Bed Incinerator Trial Burn at the Rocky Flats Plant". More detailed assessment of the health impact from indirect exposure (e.g., from any ingestion pathway which might be involved) to these chemicals and their reaction/degradation products and of any environmental effects from such pathways as acid rain or depletion of ozone would require far more complex computer modeling and technical interpretation than we have available at the Rocky Flats Plant. Such an assessment would necessarily include a high degree of uncertainty in its results. Environmental Management estimates that it would take about two to three months to engage an outside contractor for this effort. It cannot be estimated at this time how long it would take the contractor to complete the project.

PRELIMINARY HEALTH EFFECTS ASSESSMENT RESULTS

A preliminary assessment of health effects from the released chemicals indicates that yearly average air concentrations for the maximally exposed individual in the public would be far below the most stringent Threshold Limit Value (TLV), established for routine occupational exposure. TLVs are used for comparison because no standards for protection of the public currently exist. Hazard Indices (the ratio of the projected air concentration to the applicable TLV) range from 10^{-7} to 10^{-4} .

The preliminary assessment of predicted cancer risk for carbon tetrachloride results in a calculated excess cancer risk for a lifetime exposure to the maximum yearly average air concentration in any sector at the Plant boundary which ranges from $2.3\text{E-}7$ to $1.4\text{E-}4$, with a geometric mean of $1.5\text{E-}5$ (that is, a risk of 1.5 in 100,000). As indicated previously, the cancer risk from the carbon tetrachloride release is expected to be the highest cancer risk for any of the potential carcinogens released.

The Rocky Flats Area Office may find that the results of the preliminary assessment provide sufficient information to determine that further assessment is unjustified, particularly in light of the high degree of uncertainty that would be associated with such an assessment.

Enclosure (1) to Rockwell
letter 88-RF-3004 dated
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REFERENCES

- ACGIH, 1987-88 American Conference of Governmental Industrial Hygienists, "Threshold Limit Values and Biological Indices for 1987-1988," Cincinnati, Ohio
- EPA, 1984 Environmental Protection Agency, "Health Assessment Document for Carbon Tetrachloride," EPA -600/8-82-001F, Sept., 1984